

I placed a plate of iron under the surface of a solution of the sulphuret of potassium, and rubbed it there with a piece of wood which had been soaking for some time in the same sulphuret. The iron was then neutral or very slightly positive to platinum connected with it. Whilst in connection with the platinum it was again rubbed with the wood so as to acquire a fresh surface of contact; it did not become negative, but continued in the least degree positive, showing that the former negative current was only a temporary result of the coat of oxide which the iron had acquired in the air.

1039. Nickel appears to be subject to the same action as iron, though in a much slighter degree. All the circumstances were parallel, and the proof applied to iron (1038) was applied to it also, with the same result.

1040. So all these phenomena with protoxides and peroxides agree in referring the current produced to chemical action; not merely by showing that the current depends upon the action, but also that the *direction* of the current depends upon the direction which the chemical affinity determines the exciting or electromotive anion to take. And it is, I think, a most striking circumstance, that these bodies, which when they can and do act chemically produce currents, have not the least power of the kind when *mere contact only* is allowed (857), though they are excellent conductors of electricity, and can readily carry the currents formed by other and more effectual means.

1041. With such a mass of evidence for the efficacy and sufficiency of chemical action as that which has been given (866, 1040); with so many current circuits without metallic contact (1005) and so many non-current circuits with (855); what reason can there be for referring the effect in the joint cases where both chemical action and contact occur, to contact, or to anything but the chemical force alone? Such a reference appears to me most unphilosophical: it is dismissing a proved and active cause to receive in its place one which is merely hypothetical.

*[ix. *Thermo-electric Evidence*

1042. The phenomena presented by that most beautiful dis-

covery of Seebeck, thermo-electricity, has
occasionally and,
also, recently been adduced in proof of the
electromotive